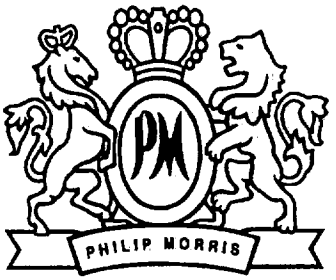

PHILIP MORRIS EUROPE R&D

THREE-YEAR PLAN

1993 - 1995

CONFIDENTIAL

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PM Europe R&D Three-Year Plan

Table of Contents

Executive Summary ..... p. i

I. Mission Statement ..... p. 1

II. Internal Analysis ..... p. 2

A. Organization and Structure ..... p. 2

B. Current Programs ..... p. 2

C. R&D Projects ..... p. 3

D. R&D Achievements ..... p. 3

III. R&D Issues ..... p. 12

IV. External Analysis - Within Philip Morris ..... p. 16

1. Factory Support Issues ..... p. 16

2. PM USA ..... p. 17

External Analysis - Outside of Philip Morris ..... p. 19

1. Market Trends ..... p. 19

2. Political and Social Trends ..... p. 32

3. Environmental Concerns ..... p. 33

4. Competitive Intelligence ..... p. 34

V. R&D Plan ..... p. 53

VI. Action Plans ..... p. 65

VII. Resource Allocations ..... p. 82

VIII. Internal Issues ..... p. 84

A. Introduction ..... p. 84

B. Project System ..... p. 84

C. Patent Policies ..... p. 84

D. Consumer Testing ..... p. 85

2025446763

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E. QA Resources ..... p. 85

F. Collaboration with S&T and INBIFO ..... p. 86

G. Interaction with Marketing ..... p. 87

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Executive Summary

The PM Europe R&D Three-Year Plan, 1993-1995, has been developed with an eye towards a more aggressive role for R&D in the future of PM Europe's business. As a result, this year's plan is vastly more comprehensive than any previous R&D planning document, with increased attention being given to the critical external and internal factors which impact on the ability of R&D to serve the special needs of both the EEC and EEMA Regions. Extensive effort has been given to an increased understanding of our business environment, as well as to a thorough self-examination of R&D structure and activities.

Some of the critical external factors examined include:

1. Market trends in our target markets;
2. Competitor strengths, weaknesses, and potential strategies;
3. Proposed restrictive legislative initiatives.

Some of the critical internal factors examined include:

1. Prioritization and selection of essential programs;
2. Rapidly changing demands due to the acquisition of new affiliates;
3. Resource allocation in a constant headcount situation.

This in-depth analysis provides the background with which R&D can align its programs and resources to best satisfy the five Strategic Goals in support of the business. These are:

1. Support Operations' three year objectives in the areas of quality, cost, and productivity;
2. Support the growth of EEC and EEMA Region businesses in the short term;
3. Develop new and innovative products which address consumers' desires in the long term;
4. Identify, evaluate, and develop technologies applicable to future products and processes;
5. Address external issues and requirements.

The Three-Year Plan represents a substantial effort on the part of R&D to better integrate its activities with the business of the Regions, and to operate in a business fashion. We have attempted to identify, evaluate, and, if possible, address many of the issues with which we are faced. This will be an ongoing effort in the changing environment in which we are operating, and will require input and guidance from both Regions.

R&D expects that those who read the Plan - if not in its entirety at least those sections of most relevance - will be able to provide the feedback necessary to assist us in executing the continuous change and improvement required for R&D activities. As in any quality management program, the efficiency and effectiveness of R&D must be measured by its ability to meet the requirements of its customers.

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PM Europe R&D Three Year Plan: 1993-1995

I. Mission Statement

The Mission of PM Europe R&D is twofold - first, to ensure that its efforts continuously contribute to the growth and profitability of Philip Morris Europe, and secondly that it conducts its daily operations so that they rigorously adhere to the highest scientific principles.

There are five major areas to which PM Europe R&D must contribute:

A. Support PM Europe's factories, particularly in the areas of quality assurance and process development. R&D must ensure that our products and raw materials are of the highest quality, as well as contributing to the continuous improvement of factory operations.

B. Support PM Europe Marketing through the development of new products. Decisions concerning products to be developed must be based not only on requests from the PM Europe Marketing Department, but must also be based on market trends and competitive analysis. The development of new product technology must also be pursued.

C. Ensure that PM Europe operations and facilities meet local regulations and are completely consistent with all aspects of the Philip Morris Companies' environmental philosophy. This requires the participation of every department within R&D.

D. Contribute to productivity improvements and develop procedures to increase operational efficiency.

E. Interact closely with all Philip Morris Companies' R&D facilities to ensure that synergy is achieved both through elimination of duplication and utilization of novel discoveries where appropriate.

Lastly, it must be emphasized that PM Europe R&D has an unfailing responsibility to carry out its work while maintaining complete scientific integrity and apply a total quality philosophy to its internal operations.

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II. Internal Analysis

A. Organization and Structure

The PM Europe Research and Development Laboratory currently has a budgeted staff of 181 individuals. The laboratory is divided into five sections; namely, Product Development, Quality Assurance, Research, Process Development, and R&D Services. Budgeted head-count for each of these sections are as follows: Product Development, 23; Quality Assurance, 75; Research, 30; Process Development, 16; and R&D Services, 30. In addition, there is an administrative staff of 7. The total R&D operating budget is projected to be 41.2 million SFr for 1993, including 4.1 million SFr for INBIFO, with projected increases of 2.7 million SFr in 1994 and an additional 3.7 SFr in 1995. No increase in head count is projected for 1993.

B. Current Programs

Nine major programs were outlined in the previous PM Europe three-year plan. These programs are listed as follows:

Operations Support
Reconstituted Tobacco
Expanded Tobacco
Product Development
New Product Technology
Product Evaluation/Consumer Desires
New Process Technology
Environmental Tobacco Smoke
Pesticides, Ingredients and the Environment

Six issues were covered under the Operations Support Program. These issues were: 1) enhancing the quality of our products, 2) standardizing quality assurance functions at all locations, 3) ensuring the consistent quality of our products, 4) ensuring that all products conform to PM quality standards, 5) ensuring that PM Europe meet its volume projections despite limited capacity, and 6) ensuring the consistent and optimal quality of blend component processing.

An initial manpower allocation survey was conducted to determine the percentage of R&D personnel working on each of the above programs. The results of this survey were then used to determine if changes needed to be made in program definition. No significant resources were any longer being devoted to the issue of PM Europe capacity. As a consequence, it was decided to no longer consider this as an issue within the Operations Support Program. Although only limited resources are currently being allocated to both Reconstituted Tobacco and Expanded Tobacco, the decision was made to retain both of these as major programs because both topics are key issues to the business. The same is true of the Environmental Tobacco Smoke Program. Discussions among R&D Management have resulted in some changes to the R&D Programs, however. The most significant change is in the Product Development area. It was decided not to retain Product Evaluation/Consumer Desires as an independent program since the activities covered by this program can best be regarded as strategies within either the Product Development or New Product Technology Programs. Replacing this is a program entitled Competitive Environment. This program will allow us to focus on competitive activities in order to improve our response to new products and changes in the level of quality for competitive products. There have also been some changes made to the issues covered within the Operations Support Program, and the Pesticides, Ingredients and the Environment Program has been renamed.

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C. R&D Projects

For some time PM Europe R&D has had a Project Cost Accounting System. This system utilizes projects in order to allocate time worked by laboratory personnel. Each separate activity is defined as a single project, so that the total number of projects is quite large. As of April 1, 1992, there were approximately 350 open projects. This number is too large to allow projects to be used as a planning tool. Consequently each project was assigned, somewhat arbitrarily, to one of the nine programs in order to determine resource allocations as of April 1, 1992, for each of the major programs. The results of this exercise is shown in Table I. As can be seen from Table I, about 62% of the resources allocated to projects, that is, excluding resources assigned to administration and overhead, are allocated to the Operations Support Program. The next largest program is Pesticides, Ingredients, and the Environment with about 12% of the resources. Product Development has about 9% of the lab's resources, and all other programs have only 3% or less. This clearly illustrates that the major assignments for PM Europe R&D by far are to support the current business or to fulfill external requirements with only relatively few resources being devoted to growing the business. The original raison d'etre for the Project Cost Accounting System no longer exists. At one time work was billed back to the organization for which it was performed. This is no longer the case. As a consequence, this System will be altered so that it can be used as a management and planning tool.

D. R&D Achievements

1. Major Accomplishments

Major accomplishments by PM Europe R&D during 1992 are listed below arranged by program.

a. Operations Support

(1) Objective - Improve quality of PM products through improvement of materials and methods.

(a) The qualification of upgraded high porosity plug wrap from Dexter was completed, while a similar plug wrap from Schoeller and Hoesch will be completed in early 1993.

(b) Various grades of improved cigarette papers from de Mauduit and Schoeller and Hoesch with improved machinability on high speed makers were successfully qualified.

(c) The study designed to achieve both quality improvement and standardization of the monogram inks used at the various PME locations was completed. Six standard colors are now used throughout the region, all of which are supplied with improved rheological properties.

(d) The Region-wide qualification of chocolate liquor and cocoa powder from Jacob Suchard Tobler (JST) as well as the "Thoresen cochise" which uses 100% ground JST cocoa shells was successfully completed.

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TABLE I

1992 Resources Assigned by Cost Center and Program

Resources Allocated as a % of Total Resources

	500	501	502	503	504	505	507	508	509	Total
Operations Support	0.208%	7.718%	1.653%	21.266%	6.183%	0.411%	5.080%	0.000%	19.752%	62.271%
Enhance Product Quality	0.082%	3.383%	0.271%	0.823%	0.005%	0.005%	2.208%	0.000%	1.648%	8.424%
Standardize QA Function	0.106%	1.155%	0.019%	2.853%	0.000%	0.406%	0.650%	0.000%	6.935%	12.125%
Maintain Consistency	0.000%	0.000%	0.237%	0.329%	0.000%	0.000%	0.590%	0.000%	0.865%	2.020%
Quality Standards	0.014%	3.180%	1.025%	17.059%	0.179%	0.000%	1.633%	0.000%	9.999%	33.089%
Capacity Requirements	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
Tobacco Processing	0.005%	0.000%	0.101%	0.203%	5.999%	0.000%	0.000%	0.000%	0.304%	6.613%
Reconstituted Tobacco	0.000%	0.000%	0.048%	0.019%	0.805%	0.000%	0.000%	0.000%	0.058%	0.931%
Expanded Tobacco	0.000%	0.000%	0.000%	0.000%	0.624%	0.000%	0.000%	0.000%	0.000%	0.624%
Product Development	0.034%	0.440%	5.021%	1.659%	1.914%	0.000%	0.097%	0.000%	0.150%	9.314%
New Product Technology	0.000%	1.243%	1.498%	0.324%	0.053%	0.097%	0.000%	0.000%	0.000%	3.215%
Product Evaluation/ Consumer Desires	0.000%	0.000%	2.141%	0.556%	0.000%	0.000%	0.000%	0.000%	0.000%	2.697%
New Process Technology	0.000%	0.000%	0.043%	0.029%	1.377%	0.000%	0.000%	0.000%	0.000%	1.450%
Environmental Tobacco Smoke	0.000%	2.160%	0.000%	0.000%	0.000%	0.043%	0.000%	0.000%	0.000%	2.204%
Pesticides, Ingredients & The Environment	0.373%	7.846%	0.043%	2.151%	0.082%	0.029%	0.227%	0.000%	1.305%	12.056%
Support	0.703%	1.411%	0.000%	1.073%	0.097%	0.000%	0.356%	0.232%	1.295%	5.166%
Total	1.317%	20.818%	10.449%	27.076%	11.136%	0.580%	5.760%	0.232%	22.560%	99.928%

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(e) The evaluation of the Filtrona FPZ-100 apparatus for the determination of plasticizer content in filter rods was completed. It was shown that the current "Wet and Dry" method can be replaced by this apparatus resulting in considerable cost savings through application at all PME affiliates.

(f) The study to evaluate the influence of tipping paper moisture on machinability was completed.

(g) Completed the development of near infrared methods for QA inspection of aftercut flavors, burley top casing, and bright casing. Initial trials in Berlin have been successfully conducted.

(2) Objective - Provide and distribute quality assurance know-how throughout the EEC and EEMA Regions.

(a) PM-Eger was integrated into the PM Europe system with regard to product monitoring and the establishment of material, ingredient, and product specifications. In addition, temporary assistance was provided for the establishment of local manufacturing specifications.

(b) The PM Infestation Control program was reviewed with special focus on written sanitation programs for factories and warehouses. All affiliates as well as numerous licensees were visited.

(c) QA assistance was provided to affiliates with the goal of improving the QA systems in the areas of organization, instrumentation, and training. Some specific sites involved were: Eger, Hungary (QA improvement training); Tenerife, Spain (QA instrumentation training); and Philsa, Turkey (training in QA concepts, preparation of statistical process control training package).

(d) Technical support was provided to PME affiliates and licensees to improve the visual quality audit (VQA) results through on-site visits, machinery improvement programs, and implementation of the new set of VQA standards. Specific sites included: Verona, Bologna, Rovereto, and Modena, Italy; Eger, Hungary; Logrono/Andorra, Spain; Bouake, Ivory Coast; and Dakar, Senegal.

(e) Review of the PME central methods system was initiated in order to bring this system in line with ISO 9000 requirements.

(f) Quality system audits were performed, mainly in Eastern European countries. The audits were followed up by the development of proposals for improvements and/or modifications; implementation of such improvements; training supervision of local personnel in Neuchâtel; and support in the acquisition, installation, and implementation of required QA equipment. Examples of specific projects include: an audit of CSFR followed-up by the development of a complete QA system for all five factories; the starting up of one production line in Samara as well as supervising a four week training

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course for Samara QA personnel in Neuchâtel; and installation of a QA system at Ilorin including QA instruments.

(3) Objective - Assure that quality objectives and quality perception, and the measurement and interpretation of QA data, are standardized throughout PM Europe.

(a) Completed the establishment of experimental capability curves for a number of tow items from our filter suppliers.

(b) Completed an extensive blind product test program on Marlboro Red, Marlboro Lights, Chesterfield, and Chesterfield Lights among a large number of smokers in order to qualify the Marlboro concentrated base flavors. It is planned to implement the changeover to this flavor system in April, 1993.

(c) The inspection procedure for ingredients, filter additives, and adhesives has been completed and will be distributed by the end of 1992.

(d) The smoking lab expert meeting working group finalized the entire smoking laboratory methods package. Tobacco analysis using AutoAnalyzer methods were also revised and made compatible with Coresta recommended methods.

(e) Standardized methods of regular production and maintenance evaluation, based on the Quantitative Descriptive R&D Panel methodology, have been developed and presented to the organizations in charge of the panels in Germany, Holland, and Spain.

(4) Objective - Assure that all PM products conform to PM quality standards and regulatory requirements.

(a) Application of the new VQA method was applied to the products of all licensees.

(b) PME Materials Quality Audit (MQA) and PME Purchasing have completed the 1991-1992 Supplier Overall Rating report. A special report covering only technical issues was created by the MQA group and distributed to the appropriate organizations.

(c) New ISO norms for smoke analyses were introduced into the three European smoking laboratories. Additional developments were implemented, and improved techniques were applied.

(5) Objective - Develop and implement programs focused on standardization of primary processes and tobacco materials.

(a) The Tobacco Processing Quality Program (TPQP) continued. A new reduced sampling plan, including the central audit of final cigarettes at R&D, was implemented. The development of a new quarterly report with improved analysis and interpretation of the data was initiated.

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(b) Extensive support was provided to EEMA concerning the new primary and the new stem line at Tabak A.S., Kutna Hora, CSFR. Assistance is also being provided for the up-grade of the burley processing line in Straznice, CSFR.

(c) The qualification and standardization of two new Proctor and Schwarz dryers in Berlin were completed.

(d) A new stem line was implemented at ZPT in Krakow, Poland, including evaluation and qualification of the stem products.

(e) The Berlin up-date of the Primary Information Manual was completed, while the Munich up-date is anticipated to be completed before the end of 1992.

(f) Support was provided to FTR for the design of a new primary and for improvements to the existing primary.

(g) Extensive support was given to the Dresden Engineering Department in order to define the up-grade of the Vezifa primary operation.

b. Reconstituted Tobacco

Objective - Define, in collaboration with PM Europe Leaf and PM USA, our company's worldwide sheet requirements versus capacities and develop alternate sheet products.

(1) The evaluation and qualification of an RL-TC type reconstituted sheet material produced at LTR was completed. This material (LTR 003) has been qualified as a substitute for RL-TC in PME brands.

(2) A system was implemented for PME affiliates to classify and ship their factory-generated by-products for feedstocks in reconstituted tobaccos.

(3) Assistance was provided to Bandtabak Malchin for improved sheet quality and to Vezifa in order to balance by-product generation with sheet needs.

(4) The humectant standardization program for BL was completed. Reduced humectant BL will be produced as of the beginning of 1993.

c. Expanded Tobacco

Objective - Implement process and product quality improvements, standardization, and adequate safety procedures in the four European ET facilities.

(1) The ET-Pan-Europe report was completed. Recommendations for improvements and standardization were discussed with affiliates and have either been implemented or are on-going. Priorities and procedures were defined.

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(2) Both the Control System and the CO_2 Piping Hazard Reviews were implemented at all European ET locations, and final reports were issued by Kellogg.

(3) The concept of a European DIET Safety Committee was established and agreed upon with affiliates.

(4) Diana ET produced at MTI Bologna was evaluated and qualified. Assistance was provided to MTI, and processing specifications were established.

d. Product Development

Objective - Modify existing products and develop new products to meet Marketing, productivity, standardization, and/or regulatory requirements.

(1) All three "East German" brands - F6, Juwel, and Karo - were modified to meet the 15 mg 1993 tar ceiling requirement. An F6 Lights at 9 mg was also developed and consumer tested.

(2) Several Marlboro Medium prototypes, delivering between 8 and 12 mg tar, were developed for different markets. Consumer tests were conducted in Germany.

(3) Marlboro rolls were developed for the German market.

(4) The development of two 3 mg products, Muratti Super Lights (Ultra Slim) and Diana Ultra Mild, for the Italian market was completed.

(5) Chesterfield Mild at 12 mg tar was developed and consumer tested in Holland.

(6) The Pan-European Marlboro Lights KS was adapted to meet the 9 mg tar delivery as determined by the new ISO procedure and successfully blind product tested in France.

(7) Chesterfield Regular for Spain was redeveloped, and its production was transferred from Spain to Belgium.

(8) A prototype using the "Toucan" blend was successfully consumer tested in Belgium versus L&M FF and in Germany versus L&M.

(9) A new low cost light KS American blend product was developed and introduced into France in parallel with the launch of the Full Flavor L&M.

(10) Apollo Soyuz was developed for sourcing both ex-Brazil and ex-Germany.

(11) A Marlboro Red KS made in Austria using the Pan-European blend concept was successfully tested versus the former standard and the German MLK. It was implemented in mid-1992.

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(12) Marlboro 100s for Switzerland was modified to meet the Pan-European tar target of 15 mg.

(13) L&M Lights Menthol Ultra, as well as a Bond Extra Mild, were developed and launched in Finland.

(14) Multifilter 100s, Helikon 2000, and Helikon Lights 2000 were developed and launched in Hungary.

(15) L&M KS and LS were developed for sourcing ex-FTR for Poland and Romania, respectively.

(16) A new KS Virginia type cigarette was developed and launched in West Africa under the Bond Street trademark.

e. New Product Technology

Objective - Increase the effectiveness in technology management in order to improve product innovation and create new and innovative ideas/concepts for the cigarette market.

(1) The development of a new cigarette modelling system was initiated based on four distinct modules - pressure drop and flow simulation, rod delivery, filter efficiency, and puff count. The advantages of this new model lie in the improved simulation possibilities for elaborating designs such as combined filters or novel filtration materials.

(2) An extensive study with the objective of developing low-cost cigarettes through modification of tobacco cut width was completed. A final report summarizing product description, potential cost savings, mass balance at the cigarette maker, and recommendations for consumer tests was issued.

(3) Technology to easily alter smoke exit flow patterns was developed. Several different types of patterns were selected, and tests to determine the effect of flow patterns on subjectives will be completed by the end of 1992.

f. Product Evaluation/Consumer Desires

Objective - Develop our understanding of consumer perceived product performance.

(1) With the goal of redesigning the standard questionnaire used in product tests, qualitative and quantitative studies were conducted in a combined effort between Marketing Research (EEC and EEMA) and R&D.

(a) Qualitative studies on vocabulary were conducted in Germany, Holland, Belgium, Spain, and Switzerland. A catalogue of attributes and descriptors to be used in consumer tests which are well understood by "naive" smokers is now available.

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(b) As a follow-up of the vocabulary research, quantitative studies were conducted with the objective of measuring the power of explanation and the level of importance of the attributes and descriptors that were defined from the qualitative studies.

(2) The computerized model that correlates market dynamics with measurable and subjective properties of both PM and competitive products has been evaluated, and its optimization will be complete by the end of 1992.

g. New Process Technology

Objective - Develop, evaluate, and implement new processing technologies for potential application in PM facilities.

(1) The evaluation of cut filler recovery from winnowers was completed. The potential cost savings was determined, and PMG-Berlin implemented the process using existing equipment on their stem line.

(2) The installation of the new HT tunnel in the Miniprimary was completed. Initial testing on cut rag resulted in filling power enhancement (5.7%) and tobacco weight savings in cigarettes at equal firmness (20mg).

(3) The evaluation of cut stems from BOZ and Berlin through the new Comas stem line in Rovereto was initiated.

(4) The effect of cut width on filling power and cigarette firmness was determined.

h. Environmental Tobacco Smoke

Objective - Assess the impact of environmental tobacco smoke (ETS) on indoor air quality.

(1) Completed detailed kinetic studies to determine the rate of reaction of gas phase nicotine with nitrogen oxides.

(2) Developed technology for the generation and accurate measurement of gas phase nitrous acid.

(3) Developed a method for the determination of solanesol in air to evaluate this compound as a possible marker for ETS.

(4) Completed a detailed study utilizing gravimetric procedures to determine sidestream tar yields. Made a recommendation to switch methodology to visibility measurements.

i. Pesticides, Ingredients & The Environment

Objective - Ensure that blend components, non-tobacco materials, finished products, and packaging comply with existing and future legal requirements in both the EEC and EEMA Regions.

(1) Developed a method for the crop protection agent pendimethalin.

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(2) Currently developing a more accurate procedure for Dulcamara, a forbidden substance under German food law, which will be complete by the end of 1992.

(3) Developed an improved procedure for the determination of the crop protection agent endosulfan.

(4) Developed a procedure for the determination of the crop protection agent ethyl carbamate.

(5) Development of an improved method for the crop protection agent MH-30 is being carried out collaboratively with INBIFO and is scheduled to be completed by the end of 1992.

(6) Completed a study determining the kinetics of migration of volatiles from packaging to tobacco, and vice versa, which can be used to evaluate the barrier properties of alternate inner wraps.

(7) Carried out several ECO Audits on Eastern European factories.

2. Patents

During the period between July 1, 1991, and March 31, 1992, there were a total of 22 issued patents or published patent applications assigned to Fabriques de Tabac Réunies S.A. (This time period was used to allow a direct comparison to be made with the numbers of patents from our competitors which will be covered in the External Analysis Section.) The majority of these patents did not originate within R&D, however. Nine patents originated within the Packaging Engineering Group in Lausanne, all of which were design patents for new types of packaging. Eleven patents originated from the Engineering Departments in Neuchâtel. Only two patents originated from R&D. One of these, Deutsches Patentschrift DD 297 714, claims a new method of collecting and determining the yield of sidestream smoke, while the second, EPO 448 220 A1, discloses a method for controlling the cigarette beetle through the use of Bacillus thuringiensis.

It is difficult to directly compare the number of patents originating from FTR with our European competitors, because we do not know enough about the organization of their technology function to determine what departments are included in their R&D laboratories. If one were to attempt to make such a comparison, however, it would probably be valid to exclude the packaging design patents, simply because similar patents have not been detected from our competitors. On the other hand, many of the patents originating from PME competitors deal with engineering technology. The assumption has been made, therefore, that the technology protected by these patents was developed in an R&D environment. Consequently, it appears legitimate to include the 11 engineering patents for comparison purposes. Based on this assumption, it can be said that PME has produced more patents in the nine month period under discussion than any other competitor with the exception of BAT.

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III. R&D Issues

A. Introduction

The major R&D issues are listed below. This list of issues will define the major programs for the 1993-1995 Three-Year Plan which will be presented in Section V. In addition all of these issues fit within the framework of the five strategic goals used by both the PM Europe and PM USA R&D Laboratories. A number of questions are listed under each issue. These questions will be discussed further in Section IV which covers external analysis. Answers to these questions are required in order to develop meaningful strategies to address the issues.

B. Strategic Goal Number 1 - Support Operations' three year objectives in the areas of quality, cost, and productivity.

1. **How do we optimize the quality of our products to meet consumer expectations while at the same time minimizing those efforts which do not actually address consumer desires?**

   a. What aspects of quality are important to the consumer?

   b. To what extent can we expect R&D technical support for the VQA program to grow during the next three years?

   c. What is the status of our competitors' quality?

2. **How do we ensure that raw materials meet PM quality standards while addressing the inevitable increase in sample load, and how can we set optimum specifications for non-tobacco materials to minimize variations in the performance of finished products?**

   a. What is the anticipated requirement for R&D resources devoted to incoming materials inspection during the next three years?

   b. What specifications can be revised to improve product performance?

   c. What is the status of our current vendors?

   d. What measures can be taken to increase vendor partnering in order to reduce QA resources required for incoming materials inspection?

   e. What new technologies can be developed to reduce resources required for incoming materials inspection?

3. **How should R&D support Operations with respect to improvements in factory productivity and reductions in costs through enhancement of non-tobacco material quality and the use of alternative materials?**

   a. In what areas can improvements to non-tobacco materials have an impact on factory productivity?

   b. Where can cost savings be achieved through the use of less expensive materials?

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4. **How do we standardize our Quality Assurance functions in all locations where PM products are produced in order to assure uniformity of product performance and product quality?**

   a. What are the key areas in which standardization is important?

   b. To what extent can the resources required for this function be expected to increase during the next three years?

5. **How do we manage our overall quality program to ensure that the required objectives are met, while at the same time ensuring that the cost of quality is minimized?**

   a. What is the cost of non-quality?

   b. What is the best tool to manage the overall quality program?

6. **How should R&D support Operations with respect to process technology in order to optimize factory productivity?**

   a. What are the anticipated resources which will be required for the PME R&D Process Development group in order to support new Eastern European factories, particularly with respect to primary projects?

   b. What are the anticipated resources which will be required for the PME R&D Process Development group with respect to support in the areas of tobacco processing and specific blend component processing?

7. **How do we ensure sufficient quantities of reconstituted sheet materials for our future needs?**

   a. What are the anticipated sheet requirements for PME during the next three years, and how can these needs best be met?

   b. Will there be a need for Cast Leaf during the plan period, and how will such a need be fulfilled?

   c. What is the anticipated level of support that the PME R&D Process Development group will need to provide in the area of reconstituted tobacco?

8. **How do we ensure that the four European ET locations meet the future requirements for expanded tobacco?**

   a. What is the anticipated level of support that the PME R&D Process Development group will need to provide in the area of expanded tobacco?

   b. How can the PME R&D Process Development group best implement the utilization of NET ?

   c. What will R&D's role be in ensuring the safety of expanded tobacco processes?

C. **Strategic Goal Number 2 - Support the growth of the EEC and EEMA Region businesses in the short term.**

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How do we reposition our current brands and introduce brand extensions and new brands to assure coverage of the important market segments?

1. What are the key market trends in the EEC Region?

2. What are the key market trends in the EEMA Region?

3. What are the Marketing Department plans with respect to both the EEC and EEMA Regions?

4. What are our competitors doing in both the EEC and EEMA Regions?

5. What are the major opportunities for growth in both the EEC and EEMA Regions?

D. **Strategic Goals Numbers 3 and 4**

Develop new and innovative products which address consumers' desires in the long term.

Identify, evaluate, and develop technologies applicable to future products and processes.

1. **How do we identify and evaluate new product technology which will allow us to be a leader in innovative product concepts and will enable us to respond to competitive challenges?**

   a. What social issues may lead to opportunities for new products?

   b. What new product technology is being developed by competitors?

   c. What role should PME R&D be playing in the development of alternative smoking devices?

   d. What new technology directed toward the development of ultra low delivery cigarettes should R&D be pursuing?

2. **How do we build our knowledge of consumer desires to enable us to develop market-led products?**

   a. To what extent should R&D be collaborating with Market Research in obtaining consumer data?

   b. What can be learned from studies being carried out by the PM USA R&D Product Evaluation Division on consumer research?

3. **How do we identify and evaluate new process technology which will allow us to maintain product quality leadership in the industry?**

   a. What new process technology will be required over the plan period?

   b. What new technology is being developed both by PM USA and other PM Companies which may have applications for PM Europe?

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E. **Strategic Goal Number 5 - Address external issues and requirements.**

1. **How do we confront attacks on PM and our industry based on presumed health risks of environmental tobacco smoke?**

   a. What support can PME R&D provide to Science and Technology with respect to environmental tobacco smoke?

   b. What research can be undertaken which may alter the chemistry of fresh or aged sidestream smoke?

2. **How do we anticipate and satisfy all the regulatory requirements dealing with both product safety and environmental pressures?**

   a. What is the anticipated increase in analyses for pesticide residues during the plan period?

   b. What regulations can be anticipated with respect to packaging which will require R&D to develop new packaging materials?

   c. What new environmental regulations can be anticipated during the plan period which will impact our business and require R&D resources?

   d. What new government regulations other than environmental regulations can be anticipated during the plan period which will impact our business and require R&D resources?

   e. What impact will the ECO Audit Program have on R&D?

   f. What technical information can be developed which can be utilized to ensure that regulatory decisions are based on the best possible science?

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IV. External Analysis

A. Within Philip Morris

1. Factory Support Issues

a. Quality Assurance Department

The PME Quality Assurance Department is divided into four groups - Product QA, Materials QA, the Manufacturing Services Group, and the Quality Systems Group. Budgeted head count for these four groups are 36, 25, 8, and 6 individuals, respectively. Needless to say the majority of these resources are allocated to supporting PM Europe's licensees and affiliates.

Product Quality Audit Group - The major activities for the Product Quality Audit Group are: 1) cigarette information analysis; 2) visual quality analyses; and 3) laboratory monitoring. In addition there are a number of specific projects. A total of 18.5 man years are allocated to cigarette information analysis. About 20% of these resources are in support of affiliate factories, while the remaining 80% are in support of headquarters. Resources allocated to visual quality analyses consist of 10.0 man years, about 70% of which is allocated to affiliate factories, and the remaining 30% is in support of headquarters. A total of 3.5 man years is devoted to laboratory monitoring, about 40% being allocated to support of affiliate factories with the remaining 60% in support of headquarters. The remaining head count within the Product Quality Audit Group is allocated to special projects.

Materials Quality Assurance Group - This group has six major activities; namely, 1) incoming inspection for FTR production; 2) evaluation of new or modified materials; 3) vendor programs; 4) tobacco monitoring; 5) infestation control; and 6) technical support to affiliates, licensees, headquarters, and R&D. Within these activities 8.6 man years are dedicated to the support of individual factories, 2.5 man years to general support of all factories, and 11.2 man years to support headquarters and R&D.

Manufacturing Services - The Manufacturing Services Group has three major activities; namely, 1) specifications for products and flavors/casings; 2) monitoring of PM products in the EEC and EEMA markets; and 3) improvements of products and yields through improvements to materials and manufacturing processes. A total of 2.2 man years is devoted to the support of individual factories, 2.7 man years to the general support of all factories, and 3 man years to the support of headquarters.

Quality Systems Group - This group also has three major activities: 1) establishment and training of QA departments in newly acquired factories; 2) improvement of quality through training of affiliates and licensees; and 3) standardization of critical QA methodology throughout the region. Support to individual factories requires 3.8 man years, while 2.2 man years are allocated for programs for all regional QA departments.

Since the Quality Assurance Department is primarily responsible for factory support, their work load would be expected to increase as the number of factories they support increases, as sales increase, and as the number of different brands increases. All of the above have been taking place for some time, and not surprisingly head count for the total Quality Assurance Department has grown as well. Budgeted head count has increased by two people every year since 1989. One of the assumptions with which the 1993-1995 PM Europe R&D Three-Year Plan must operate is that there will be no head count increase during the plan period. Consequently, the number one concern with respect to planning for QA is to develop strategies which will allow an

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increasing work load to be effectively handled with constant resources. Several strategies to accomplish this goal will be discussed in Section V including developing new technologies for incoming materials inspection, ensuring that the emphasis on product quality is placed on those aspects that are important to the consumer, developing methods to determine the cost of non-quality, and developing an over-arching quality management system.

b. Process Development

It is far more difficult to quantify the anticipated work load for Process Development projects which support PM Europe affiliates and licensees, since these projects are generally initiated by specific requests as opposed to being ongoing work. It is a reasonable assumption, however, that the work load will increase in this area as well during the plan period. Expansion within PME will undoubtedly occur in Eastern Europe. The factories which are acquired in the former Iron Curtain countries will require considerable assistance from the Process Development Department. In addition it is possible that a potential downsizing within PM USA Engineering will result in a decrease in support from the United States with a concomitant increase in work load for Europe. As a consequence, it is essential that the best attempt possible is made to proactively determine in which areas the Process Development Department will most likely be required to support PM Europe factories in order to rationally plan activities.

2. PM USA

a. PM USA R&D Five-Year Plan

(1) Introduction

The planning process for R&D was changed radically during 1992. Instead of developing an independent plan, PM USA R&D participated in ten groups which had the assignment of developing a strategic approach to the business and which consisted of representatives from many different areas within PM USA. Some of the strategies which were proposed are of considerable importance to PM Europe R&D. These will be summarized below by strategic goal.

(2) Strategic Goal Number 1

(a) Determine aspects of quality important to the consumer.

(b) Establish an understanding of age on product quality.

(c) Develop technologies to measure key process variables to facilitate process optimization.

(d) Identify monitoring techniques for certain defects.

(e) Develop a rapid analytical measure of cigarette taste.

(f) Identify the origin of taste/odor/stale complaints.

(g) Maximize the synergies of PM's world-wide leaf purchasing organization.

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(h) Improve cigarette yield by 25% in five years using technologies including new primary processing, process monitoring, NET, and Cast Leaf/NBL.

(i) Make continuous improvements in cost and quality through improvements in tobacco materials and reclamation, process monitoring, and analytical methods.

(j) Replace flax with wood pulp paper.

(k) Continue to develop partnerships with suppliers.

(3) Strategic Goal Number 2

(a) Improve the process of achieving world-wide regulatory compliance.

(b) Develop technologies for low delivery cigarettes.

(c) Develop single wrap packaging.

(d) Minimize cigarette specifications.

(4) Strategic Goal Number 3

(a) Develop products with perceived health and social benefits with particular emphasis on products with specific or total mainstream and sidestream smoke component reduction.

(b) Develop environmentally friendly products including recyclable packaging and biodegradable filters.

(5) Strategic Goal Number 4

(a) Develop new products with reduced sidestream odor and/or irritation.

(b) Develop catalysts for reduction of carbon monoxide.

(6) Strategic Goal Number 5

Develop a non-conventional commercial product using novel technology, possibly for introduction into a European market.

b. Restructuring Issues

One of the major objectives of the restructuring exercise which is presently on-going at PM USA R&D in Richmond is to eliminate overlap between work being carried out in Richmond and work being carried out by PM Europe R&D in Neuchâtel. As a consequence, a number of efforts have or will be eliminated in Richmond with the understanding that these efforts will continue at PM Europe R&D. The specific projects which will no longer be done in Richmond are the tobacco specific nitrosamine (TSNA) project, any work requiring the sidestream chamber, research on environmental tobacco smoke (ETS), pesticides method development, and cigarette testing for European brands. The impact that this decision is expected to have on PM Europe R&D will be summarized briefly below.

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The last of the activities listed above, cigarette testing for European brands, affects the PM Europe R&D Quality Assurance Department. Although testing of these cigarettes had been conducted in both Richmond and Neuchâtel, there were three tests which had only been conducted in Richmond; namely, measuring paper porosity, tobacco cylinder volume, and menthol in smoke. A decision was made not to conduct the first two determinations at PM Europe. Paper porosity can be checked when there is an observed change in smoking delivery data which can not be explained by other measurements (e.g., RTD, filter efficiency, ventilation, etc.). The information provided by determining cylinder volume can essentially be extracted from data on tobacco weight and firmness. (Firmness measurements were not carried out in Richmond.) The last measurement, however, must be added as a routine determination in the smoking laboratory. Fortunately, the impact is not major, since there are relatively few menthol brands in Europe compared to the US.

All other activities to be eliminated by PM USA R&D affect the Research Department. The impact of most of the items is small. The only additional work which will be required as a consequence of the elimination of the sidestream chamber in Richmond will be to check non-conventional products to be test marketed or introduced nationally to ensure that there have been no untoward changes in sidestream smoke chemistry. The maximum number of samples which can be anticipated in one year is two. New methods development for pesticides was already being carried out by PM Europe R&D, although some new methods were being developed by PM USA R&D as well. Depending on the number of new methods which must be developed during the plan period (see below), the work load could conceivably exceed the current resources devoted to this activity. The last activity, the TSNA project, has the greatest potential impact. A group of approximately sixteen people were working in this area in Richmond at the beginning of 1992. About half of that group was working on a genetic engineering approach which will be dropped. The remaining half of the group was working on chemical approaches to the reduction of TSNA in mainstream smoke. Some of these studies can also be discontinued. One of them, however, remains important; namely learning why certain tobaccos are naturally low with respect to the delivery of TSNA in smoke. A plan for this activity will be developed starting in October.

B. Outside of Philip Morris

1. Market Trends

a. EEC

(1) Introduction

Trends for each major market within the EEC have been analyzed in order to look for new product opportunities. This analysis focuses primarily on those categories of the market which are growing and the identification of possible new niches. Each market will be discussed separately below.

(2) Germany

There are three major trends in the German market. The first, and most important, is the growth of the ultra low tar category. The second involves a sharp decline in the entire German market in 1992. The third involves the apparent reversal in the growth of the premium and luxury price categories at the expense of the medium price category.

Year-to-date through July, 1992, the total German market had declined by about 9%. All of the top ten trade mark owners, with one exception, had experienced volume

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declines. The one exception was SEITA which had only slightly more than a 1% market share. Of the remaining nine trade mark owners, PM had suffered less than all others except for Reemtsma (6.9% decline for PM compared to a 4.6% decline for Reemtsma). The explanation for this market decline probably rests with several factors. About 35% of the decline can be attributed to the growth of the roll and quickie market (Table II). The remaining 65% can possibly be attributed to a combination of a recent tax increase and growing social pressures in Germany. Whatever the cause, it is clear that PM must be quite aggressive in the German market in order to avoid the loss of sales volume.

The most clear cut trend in the German market is the growth of the ultra-low tar category. It is somewhat difficult to extract this information because of the recent reunification of Germany. Data through 1990 are for West Germany alone, while data for 1991 and 1992 include both West and East Germany. In order to attempt to convert the 1991 and 1992 data to West Germany alone, so that valid comparisons can be made, the following assumptions were made: 1) the East German market has been stable with respect to tar category through July, 1992; 2) 11.3% of the full flavor category can be attributed to East German smokers; and 3) the percentage of East German smokers who purchase light and ultra-low tar cigarettes is negligible. When the correction for East Germany is made, the results shown below emerge:

Average % Change in Market Share, 1987-1992

Full Flavor (>10.0 mg)	-1.4%
Lights (6.1-10.0 mg)	-0.8%
Super Lights (3.1-6-0 mg)	+14.3%
Ultra Lights (<3.1 mg)	+16.7%

This trend is also shown in Figure 1. Although it is true that the full flavor segment is still by far the largest segment of the market (full flavor, 76.3%; lights, 11.5%; super lights, 9.4%; and ultra lights, 2.8% as of July, 1992), the growth of the lower two tar segments suggests that PM should concentrate its new product introduction effort in these areas. The company is in actuality doing quite well in the Super Lights category, since Marlboro Lights delivers below 6.1 mg tar. PM currently holds a 58% share of the Superlights segment. This compares to a 37% share for PM in the full flavor segment. PM's share of lights and ultra-lights, however, is 10% and 4%, respectively. Clearly we are under-represented in both segments. It should be noted that despite the observed decline for the full flavor segment, Reemtsma's West continues to capture market share.

Price trends on the German market are quite interesting and are shown in Table III. It should be emphasized that these data are for West Germany only, with the caveat discussed above. From 1987 to 1989, market share of the premium and luxury category increased from 55.4 to 58.3%. This trend is not unusual for EEC countries as can be seen below. What was somewhat unusual was that the sub-mainstream category also increased. This result could possibly be explained as the result of a declining middle class (loosely defined) with a concomitant increase in both the upper and lower economic classes. A similar phenomenon is occurring in the US. For the past three years, the market share of premium and luxury brands has begun to decline accompanied by a slow growth in mainstream and a more rapid growth in sub-mainstream. The figures for 1992 year-to-date show a noticeable decline in sub-mainstream. This is probably the result of the significant growth of the roll and quickie market mentioned above. The entire German market appears to be responding to a worsening economic situation within the country. Premium brand smokers are switching down to mainstream, mainstream smokers are switching down to sub-mainstream, and sub-mainstream smokers are buying quickies. This analysis suggests that Marlboro smokers are not themselves switching to quickies, and that eliminating the tax

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advantages for this product would not result in a significant increase in Marlboro sales. It does suggest, however, that there is a good opportunity for a mainstream or sub-mainstream product in Germany.

In conclusion, the German market presents several strategic opportunities. The most important by far requires the introduction of an ultra low tar product. This is an area which is growing rapidly, but one in which PM is under-represented. The second opportunity is to reposition some of our current brands in the full flavor area with respect to price in order to develop a successful strategy to compete with Reemtsma. This will require product reformulation in order to maintain marginal contribution from these brands. The third opportunity is to determine those product features which constitute added value to the German consumer in order to either change current products or introduce new products in the premium price category which will allow PM to maintain its market share in these areas.

(3) Italy

The Italian market has experienced a slow decline during the five year period between 1987 and 1991 of about 1.0% a year. However, year-to-date figures through July, 1992, show a total market increase of 5.2% in volume. Philip Morris continues to outperform the market as a whole with an increase in sales year-to-date through July of 9.4%. The Italian market is also experiencing a slow decline in the sale of full flavor products with a concomitant increase in all other categories. From 1987 through July of 1992 average yearly percentage changes in volume for the four tar categories have been as follows: full flavor, -2.8%; lights, +3.5%; super lights, +11.7%; and ultra lights, +9.1%. Unlike Germany, however, PM is well represented in all four categories with 40% of the full flavor category, 58% of the lights category, 54% of the super lights category, and 44% of the ultra lights category. As of July, 1992, PM's sales in the ultra light category had increased by 71%. Most of this increase (87%) can be attributed to the introduction of PM Lights Extra KS Box which has done extremely well.

Price trends in the Italian market are quite clear cut. During the five year period 1987-1991, there has been a steady decline for the two lowest (basket and popular) and the medium categories, and an increase in the two highest categories (high and premium). The average yearly decline for the basket and popular categories has been 7.6% a year, while the average rate of decline for the medium category has been 4.0%. The high and premium categories have increased at an average rate of 7.4% per year. PM sells no products in Italy in the two lowest categories, and most of its sales are in the two highest categories. PM brands account for 14.4% of the medium category, 81.6% of the high category, and 50.4% of the premium category. Needless to say, PM has benefitted greatly from the trend to higher priced products. This trend to higher prices, which is equally true in a number of other Western European countries as well, is usually attributed to a growing preference for American blended type products as opposed to the cheaper, local products. There is no question that American-type products are viewed as being of higher quality. However, there is another factor which is almost certainly operative. As the economies of Western European countries have improved, a larger percentage of the population is able to afford higher priced cigarettes. As a consequence, smoking a cigarette such as Marlboro, carries with it a definite image of affluence. It is important to note that image is essentially no longer of importance in the US market, with the possible exception of young adult smokers. Since smoking itself is no longer socially acceptable in many parts of the US, the brand one smokes is no longer important with respect to image. Should such a trend ever develop in Western Europe, it would have serious consequences for PM which is almost exclusively represented in the higher price portion of the European market.

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Source: https://www.industrydocuments.ucsf.edu/docs/ghjl0000

TABLE II

Year-To-Date (May) Sales of Tobacco Rolls in Germany
Compared to the Same Period in 1991

	Sales in Tons*		
	1992	1991	% Change
West Quickies	1286	7	18371
West Quickies Light	17	0	
Westpoint 25	889	507	175
Westpoint Lights	318	82	388
Total Segment	2510	596	421

* One ton of tobacco is equivalent to about 1.2 million finished cigarettes

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Source: https://www.industrydocuments.ucsf.edu/docs/ghjl0000

TABLE III

West German Price Trends
Market Share

	Year					
	1987	1988	1989	1990	1991	1992
Sub Mainstream	12.2	12.3	12.8	14.1	14.3	13.9
Mainstream	32.4	30.8	29.0	28.6	28.8	29.3
Premium + Luxury	55.4	56.9	58.3	57.3	57.1	56.4

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There is another trend in the Italian market which deserves mention; namely, the growth of the superslims category. As of July, 1992, this category held a 3.6% market share and appears to still be growing at a rapid pace. This is a significantly greater market share than this type of product has in the US, despite the fact that it was introduced first into the US. In addition, apparently the percentage of male and female smokers is about equal - another difference from the US where essentially only women smoke superslim type cigarettes. Likewise, the superslims category does not seem to be doing particularly well in other Western European markets. The success of the superslims category in Italy suggests that other non-conventional products may also be successful in this market. In any event, it is important to determine exactly what features of this product appeal to the Italian consumer.

In summary, the trend to lower delivery cigarettes is occurring for Italy as it is for Germany. In actuality, this trend has obviously been taking place over a longer period of time since the total market share of full flavor products in Italy is currently (July, 1992) only 58.4% compared to 76.3% for West Germany. And also, unlike Germany, PM is doing well in all tar categories. With respect to new product opportunities in Italy, the most likely area of success could well be in the area of non-conventional products. The exact nature of such a product requires further analysis of the market.

(4) France

The French market has been trending upwards since 1987, although not monotonically, with an average rate of increase of 0.7% through July, 1992. Once again, the trend to lower delivery cigarettes is striking. Over the period 1987 through July, 1992, full flavor sales have decreased at an average yearly rate of 3.0%. During the same period the lights category increased by 10.7% a year, super lights by 3.5%, and ultra lights by 4.4% a year. The major difference in the behavior of the French market compared to the German and Italian market is that the category experiencing major growth is lights as opposed to super lights and ultra lights. With respect to PM's performance in these four tar categories, it is essentially equally well represented in all of them (26.8% in full flavor, 28.2% lights, 27.6% super lights, and 20.4% ultra lights). It should be noted that Marlboro Lights, which is growing rapidly, is listed at 10 mg tar in France, whereas it is listed at 5 mg tar in Germany. This difference is quite logical given that it is the 6-10 mg segment in France (lights) which is growing rapidly, while the lights segment in Germany is experiencing slow growth at best.

Price trends in the French market are similar to Italy on the surface in that there has been a consistent move to higher priced brands. However, there are significant differences. There are five price categories in France; namely, black, cheap, international, premium, and luxury. Black, the cheapest category, has been declining steadily over the five year period 1987-1992, but it is still the largest single category. It has declined steadily at an average yearly rate of 6.5%. The other four categories have experienced average yearly increases as follows: cheap, 4.6%; international, 4.2%; premium, 2.9%; and luxury, 4.6%. Year to date market shares for these five price categories are: black, 30.0%; cheap, 17.2%; international, 22.7%; premium, 25.9%; and luxury, 4.3%. Consequently, PM has a smaller share of the French market as compared to Italy and Germany because it has virtually no representation, by design, in the lower two price segments which comprise approximately half the market. As the trend toward higher priced cigarettes continues (whether this trend is motivated by economics or cigarette type), PM should see an increase in its market share. This has certainly been the case since 1987, as average yearly market share for PM products has increased by 6.7%. It should be noted, however, that the growth of PM brands in France is being fueled primarily by Marlboro Lights, the PM family, and the Chesterfield family, and not by Marlboro Red.

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An extremely interesting recent development in the French market is the performance of Golden American KS Box 25's, introduced by Rothmans in March, 1992. This cigarette has performed extremely well, achieving a 0.8% market share as of July, 1992. This cigarette is priced as a premium brand, but undoubtedly is drawing smokers from lower price categories since the price per stick is equivalent to a pack of 20's priced in the "cheap" category. It appears that the French market should provide an opportunity for a new product introduction using a 25's pack.

In summary, the French market is similar to the Italian market with respect to both the trend to lower delivery cigarettes and the trend to increasing market share for premium priced products. However, it is the lights category which is experiencing the most rapid growth in France, as opposed to super lights and ultra lights, and the two lowest price categories still comprise about half of the French market. There are indications that products which can be construed as offering greater value for a given price would perform well in the French market.

(5) Spain

The Spanish market is quite different from the three countries discussed previously. The major difference is the lack of a trend to lower delivery products which will be discussed in more detail below. With respect to the total market, it has increased at an average yearly rate of 1.4% over the period 1987-1991. However, year to date through July, 1992, the total market had declined by 4.9%. There does not appear to be an obvious explanation for this result. It may well be that by the end of the year, a different result will emerge.

Spain is essentially a full flavor market. Market share of full flavor products has shown a negligible decline in the past five years going from 96.6% to 96.0%. During the same period, the market share of lights has increased from 3.4 to 3.7%, of super lights from 0.02 to 0.3%, and ultra lights from 0 to 0.02%. Consequently, one would not view Spain as an opportunity for lower delivery products, and Marlboro Lights, introduced over five years ago, has achieved a market share of only 0.2%. The Spanish market does exhibit a trend with respect to price which is similar to the French and Italian markets; namely, the percentage of smokers buying cigarettes in the higher price categories is growing, and like France, the lowest price category still has the highest market share. Spain has six price categories - low, medium low, medium, medium high, high, and premium. Market share for each category as of 1991 was 35.0%, 7.1%, 30.9%, 2.9%, 24.3%, and 0.4%, respectively. The lowest price category, "low," has declined at an average yearly rate of 7.0% from 1987-1991, while the medium low category has declined at a rate of 3.8%. The medium category has increased slowly, experiencing an average yearly increase of 1.1%. The next two categories have both increased much more rapidly. The average yearly rate of increase for the medium high category is 15.3%, while it is 13.2% for the "high" category over the same time period. The premium category has remained constant during the past five years; however, this category's market share is so small that it is not a factor. These data can be summarized as follows: 1) a significant decline in the lowest price category can be accounted for by these smokers moving up to the medium price category; and 2) the medium price category has changed only slightly in the past five years because the influx of smokers from the low price category is counter-balanced by an egress of smokers who have moved up to the high price category.

The Spanish market does not appear to offer any significant opportunities at this time. It is a market which changes very slowly. There is clearly a move to higher priced products, and this trend will benefit current PM products. On the other hand, there seems to be little to be gained through the introduction of new products at this time.

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(6) Other EEC Markets

The remaining EEC markets - Portugal, Andorra, Canary Islands, Belgium, Luxembourg, The Netherlands, Greece, Israel, UK, and Ireland - are either too small or, as is the case with the UK, have too little PM representation to warrant a separate analysis at this time. A very rapid analysis indicates that most of these markets seem to be changing at a slower rate than are Germany, Italy, and France, so that opportunities are also probably not plentiful. It is true, however, that when all of these markets are combined that they represent a significant amount of business. Therefore, a thorough analysis of these markets should be carried out in the future.

(7) Conclusions

There are three major trends which in general characterize the four major EEC markets - Germany, Italy, France, and Spain. Two of these trends - an increase in market share for low delivery products (with the exception of Spain) and an increase in market share for premium priced products (with the exception of Germany) have been discussed in detail above. The third trend is that sales of Marlboro Red have peaked in all of these countries. Marlboro Red sales are declining in Germany, Italy, and Spain, while they are flat in France. It is highly likely that Marlboro has reached a point in its product life cycle in Western Europe where it is now in a natural decline. Based on the analysis of a long history of product life cycles, there is probably little that can be done to reverse this decline. The brand family itself can grow through lower tar line extensions in those countries where there is an existing trend to lower delivery products. However, this strategy must be accompanied by a strategy where PM Europe repositions an existing product or introduces a new product with a different image in order to develop a growing brand. Brand image is not an R&D concern. However, the design of the product to match a given image is. Consequently, it is essential for R&D to work closely with marketing over the next year in order to develop such a product.

b. EEMA

Attempting to locate meaningful market data for EEMA markets, except for the Swiss market, has not been possible at this time. What is available are ten year sales projections for PM products in every EEMA market. It is not clear how these figures were generated. Those markets showing the largest anticipated increases over the next three years are Poland (32.2 billion units, 870% increase), Russia (16.8 billion units, 8400% increase), Turkey (10.8 billion units, 730% increase), Yugoslavia (2.8 billion, 220% increase), Hungary (2.1 billion units, 59% increase), and Egypt (1.1 billion units, 58% increase). The complete list of projections is given in Table IV. Some of these projections are based on existing sales currently being sourced outside of EEMA such as Turkey which is currently sourced by PM USA. Some of the projections will not come to pass such as Yugoslavia. Others, such as Poland, are unclear as to how the projection was made. It is essential that good market data be made available for EEMA markets, not only to ensure that ambitious projections can be met, but also to determine if markets where little or no increase in business has been projected can actually be approached more aggressively.

Information on some EEMA markets can be obtained from published literature. This information is briefly summarized below. It should be noted that in some cases this information may not be current.

Hungary - The total Hungarian market is about 26 billion units. Production is supplied by four factories. Two brands - Symphonia and Sopianae account for about 80% of sales. These two brands were originally made in all four factories, since the business was state run, and the ultimate terms of production of these brands is still being worked out. PM

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Source: https://www.industrydocuments.ucsf.edu/docs/ghjl0000

manufactures both brands at Eger, but this may well be a temporary situation. There is a clear trend in Hungary to more expensive cigarettes. In 1975, cheaper cigarettes accounted for 96.5% of the market. This figure had declined to 53.7% in 1988. Most of the remaining volume, 45.9%, is accounted for by medium priced brands. Premium brands, such as Marlboro, still have low volumes in Hungary. Hungary is primarily a full flavor market. The major trend with regard to tar delivery has been the growth of filter cigarettes in the last ten years. Introduction of new products onto the Hungarian market is difficult because of a complete advertising ban on tobacco products. Even point-of-sale promotions are difficult. The cigarette manufacturers are currently lobbying the government for the introduction of a voluntary agreement regarding cigarette advertising.

Poland - Poland is the largest market of the former Eastern European countries with an estimated volume of 94.2 billion units in early 1992. An analysis of the Polish market is extremely difficult for two reasons. The first is that there is a huge number of different brands, many of which carry fantasy trade names. Nonetheless, there is some available information at this time. Non-filter cigarettes have about 30% market share with the most popular brand being Popularne. The largest category is 70mm filter cigarettes with a 40% market share. The most popular brands are Klubowe, Radomske, Mocne, Extra Mocne, and Caro. King Size filters have a 22% market share, and the most popular brands are Klubowe, Carmen, Kapitan, Marlboro, Wiarus, and Mars. All of these brands are made by ZPT, the state owned industry. Marlboro is, of course, made under license. Imported cigarettes have about 8% market share with Golden American (Rothmans), Marlboro, Camel, and Monte Carlo (Reynolds) being the best selling brands. The second reason for the difficulties in analyzing the Polish market. is that there is a considerable amount of smuggling into Poland. Estimates range between 3 and 4 billion cigarettes smuggled into Poland during 1991, however, the number is probably closer to 10 billion. Smuggling has increased significantly because of high taxes on imported cigarettes (a 130% turnover tax and a 90% import tax), and because there is little government control on the importation. The problem is aggravated by a law which allows essentially duty free importation from less developed countries. Unprincipled distributors are taking advantage of this law by claiming false country of origin for cigarette shipments. The problem with smuggling has not gone unnoticed by the Polish government which is looking into measures to reduce this activity. A proposal to reestablish the national tobacco monopoly is under consideration. It should also be noted that there is considerable discussion regarding laws regulating smoking. A draft law would ban all tobacco ads from TV; prevent actors from smoking on screen; outlaw smoking in pharmacies, hospitals, schools, and on public transportation; include anti-smoking classes in school curriculums; and forbid smoking in offices if a non-smoker is present. A clause has even been discussed which would ban smoking in an individual's own car. At the present time, however, there is no discrimination against smokers in Poland, and there is only a single restaurant in Warsaw with a non-smoking section. Brand recognition for Marlboro in Poland is quite good, but the current economic conditions limit the number of Poles who can afford a premium cigarette. Philip Morris has an agreement with ZPT, the largest factory in Poland. It is worth noting that RJ Reynolds Tobacco International has announced plans to construct a new state-of-the-art $33 million cigarette production factory in Warsaw. Production is scheduled to begin in mid-1993.

Bulgaria - Bulgaria is a reasonably small country with a population only one-fourth that of Poland. The total domestic cigarette market is about 19 billion units; however, as will be discussed in further detail below, Bulgaria's cigarette production has been considerably higher. Bulgaria has a state owned tobacco business, Bulgartabac, and there appear to be no plans to privatize the industry in the foreseeable future. Bulgartabac has nine factories with a capacity of about 90 billion units. As mentioned above, only 19 billion units are required for domestic consumption. The remainder of Bulgaria's cigarette production is for export. Exports in 1990 were 61 billion units, which is down from 75 billion units in 1985. The export situation is most

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Source: https://www.industrydocuments.ucsf.edu/docs/ghjl0000

TABLE IV

EEMA UNIT VOLUMES FORECAST

SOURCE	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
ALGERIA	300.0	500.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0
ATO	4,743.0	4,868.0	4,970.0	4,997.0	5,018.0	5,018.0	5,027.0	5,027.0	5,036.0	5,022.0
AUSTRAL AFRICA	3,400.0	3,460.0	3,500.0	3,555.0	3,555.0	3,555.0	3,555.0	3,555.0	3,555.0	3,555.0
AUSTRIA	2,250.0	2,300.0	2,400.0	2,500.0	2,600.0	2,700.0	2,800.0	2,900.0	3,045.0	3,135.0
BRAZIL	16,007.0	16,737.2	17,011.7	17,221.2	17,093.7	17,202.0	17,396.3	17,586.8	17,813.7	18,047.5
BULGARIA	100.0	200.0	225.0	250.0	300.0	325.0	350.0	375.0	400.0	400.0
BURKINA FASO	0.0	0.0	155.0	170.0	190.0	210.0	230.0	250.0	275.0	275.0
CAMEROON	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
CONGO/UDEAC	0.0	22.0	45.0	75.0	100.0	125.0	150.0	175.0	200.0	200.0
CSFR	20,070.0	20,300.0	20,525.0	20,825.0	21,120.0	21,365.0	21,685.0	22,055.0	22,485.0	21,940.0
EGRI	3,495.0	4,290.0	5,300.0	5,575.0	5,945.0	5,765.0	6,310.0	6,880.0	7,350.0	7,775.0
EGYPT	1,940.0	2,340.0	2,645.0	3,005.0	3,165.0	3,370.0	3,525.0	3,680.0	3,835.0	3,990.0
FDS	1,700.0	2,600.0	4,500.0	5,500.0	6,000.0	7,000.0	7,375.0	7,950.0	8,375.0	8,800.0
FTR	13,759.6	13,667.3	13,844.6	14,246.4	14,672.0	15,123.1	15,601.5	16,109.3	16,648.7	17,222.0
GABON	0.0	0.0	22.0	25.0	30.0	35.0	40.0	45.0	50.0	50.0
GUINEA	0.0	0.0	0.0	315.0	870.0	1,030.0	1,040.0	1,050.0	1,110.0	1,110.0
IVORY COAST	320.0	420.0	460.0	630.0	680.0	720.0	760.0	800.0	830.0	830.0
KENYA	0.0	0.0	0.0	0.0	0.0	30.0	50.0	70.0	100.0	100.0
MADAGASCAR	0.0	20.0	60.0	100.0	140.0	190.0	235.0	290.0	345.0	345.0
MALI	0.0	160.0	400.0	440.0	480.0	540.0	540.0	550.0	560.0	560.0
NIGER	0.0	0.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0
NIGERIA	50.0	110.0	170.0	240.0	310.0	380.0	450.0	520.0	590.0	590.0
PHILSA	136.0	3,345.0	7,513.0	10,916.0	16,164.0	21,985.0	24,605.0	26,720.0	28,670.0	29,540.0
REUNION	117.0	127.0	134.0	152.0	167.0	182.0	197.0	220.0	230.0	230.0
RUSSIA	200.0	4,000.0	7,000.0	9,000.0	17,000.0	25,000.0	25,000.0	25,000.0	25,000.0	25,000.0
SENEGAL	355.0	407.0	424.0	445.0	471.0	477.0	477.0	478.0	478.0	478.0
ZPT	3,725.0	35,425.0	35,450.0	35,885.0	36,325.0	36,885.0	37,810.0	39,080.0	40,250.0	40,670.0
TOTAL	72,671	115,304	127,811	137,125	153,453	170,269	176,266	182,423	188,288	190,922

EEMA VOLUME FORECAST

Note: Includes Brazil production but excludes Argentina

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uncertain at this time. Bulgaria's primary customer was the Soviet Union, now, of course, the CIS. In November, 1991, Bulgaria halted exports to the CIS because of their inability to pay. It would appear that at this time they have considerable overcapacity. A new trade protocol between Bulgaria and the CIS has recently been signed, and it would appear that shipments to the CIS will be resumed. This protocol calls for the CIS to pay all outstanding bills. The majority of cigarettes smoked within Bulgaria are all oriental blends of Bulgarian make. Leading brands are Arda, BT, Phenix, Femina, Rodopi, and Sredetz. As in the rest of Eastern Europe there is the beginning of a trend toward American blended cigarettes. Bulgartabac now produces two fully domestic American type cigarettes - Vicotry and Welcome. In addition both Marlboro and HB are produced under license in small amounts. Estimated production of Marlboro in 1992 is 115 million units all of which will be manufactured at the Rodopi factory. Imported brands make up only two percent of the market. Foreign investment in Bulgaria would be welcome, and a law which has just been drafted by the Bulgarian Ministry of Agriculture should facilitate the entry of foreign capital. However, the state will continue to remain the dominant force in the industry.

Russia (CIS) - It is well known that cigarette production in the former Soviet Union is fraught with problems. With the collapse of the Soviet Union, each republic found itself entirely on its own. They were free to buy cigarettes from the West, if they could find the hard currency, or negotiate an acceptable countertrade. Estimated consumption in the CIS is between 430 and 440 billion units. There has been a considerable shortfall in cigarette production, estimated to be 83 billion units in 1990, and this shortfall is not expected to disappear in the near future. Problems are caused by insufficient tobacco, difficulties within the distribution system, and outdated machinery in virtually all of the CIS's 50 or so factories. The CIS is attempting to correct this shortfall through imports both from the West and Eastern Europe (see Bulgaria above); however, their lack of hard currency limits their ability to buy cigarettes abroad. The Russian market is dominated by strong cigarettes - many of them still non-filtered. The prestige factor for American cigarettes appears to have declined. No longer can a pack, or even a carton, of Marlboro pay for a taxi ride from central Moscow to the airport. Today, one can see street sellers in Moscow with trays heaped with packs of US cigarettes that they offer for 100 rubles a pack, a price that may be compared with the $2 (160 rubles) charged in the hard currency shops. Although both American and European cigarettes do well in these hard currency shops, most of the buyers are probably tourists or visiting businessmen. There has been considerable activity by Western tobacco companies within the CIS. PM has agreed to expand and modernize a cigarette factory in Krasnodar, Russia, for the manufacture of Marlboro and other brands. Southeast of Moscow, at the Samara Cigarette Factory, upgrading is underway for the production of about 300 million Marlboro cigarettes annually. RJ Reynolds Tobacco International expects to be producing about 2.4 billion cigarettes in 1992, and about 4 billion units eventually, at the Alma-Ata Integrated Tobacco Works in Kazakhstan, with which it established a joint venture last year. Reynolds and its partner will aim at nation-wide distribution of Camel and some jointly-owned cigarette brands. BAT announced in early 1992 that it had signed a letter of intent to negotiate a joint venture with three factories in the Ukraine. These three factories - the tobacco factories at Priluki and Cherkassy and the leaf plant at Montaserriska - produce about 25 billion of the 80 billion cigarettes produced for the Ukranian market each year. BAT has also stated that it will produce an American blend cigarette. The most ambitious of the joint ventures, however, is the one that Liggett has set up with the Dukat cigarette factory in central Moscow. Under this agreement Liggett will pull down the present century-old factory, put up a modern hotel on the site, and build a new tobacco factory on a site on the edge of the city. It is anticipated that the new factory will have a capacity of 22 billion cigarettes a year.

Switzerland - The Swiss market has remained static with about 16 billion in sales between 1987 and 1991. PM is the market leader with a 42.9% market share in 1991. The remainder of the market is divided between BAT (19.5%), FJ Burrus (17.3%), RJ Reynolds

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(9.7%), Rinsoz and Ormond (5.6%), and Sullana (5.0%). The market is slow to change, and if there has been a trend to lower delivery cigarettes, it is not yet large. BAT's Barclay and Mary Long, both regarded as low delivery products, increased in sales between 1990 and 1991, but the increase was small. Marlboro also increased in sales (22.3% market share in 1991 versus 21.4% in 1990) much of which is probably attributable to Marlboro Lights. It is worth noting that both of Burrus's leading brands, Parisienne and Select, lost market share in 1991. The growth of American blended cigarettes appears to have plateaued at 74%, with Maryland cigarettes holding their own at 21% of the market.

Austria - The Austrian market is 14.7 billion units and is dominated by the state-owned monopoly, Austria Tabakwerke (ATW). A total of 79 brands of cigarettes are sold in Austria. Of these, 35 are the company's own brands, 15 brands are manufactured under license, and 29 are imported brands. The share of the monopoly's brands in Austria was 71.5% in 1991, the share of the licensed brands, 26.2%, and the share of imported brands, 2.3%. Memphis Classic is the market leader with a share of 15.8%, while ATW's Milde Sorte attained a share of 11%. Marlboro, manufactured under licence, declined from 14.5% in 1990 to 10.6% in 1991. ATW sold 6.6 billion cigarettes outside of Austria, 1.4 billion of which were exported from Austria, while the remainder were manufactured elsewhere. ATW has established a domestic ultra-light market in Austria. In December, 1991, sales of ultra-light products were 156 million units. This translates into a 1.1% market share. ATW has become quite aggressive with respect to increasing its business outside of Europe, both with respect to tobacco manufacturing and cigarette exporting as well as the tobacco products wholesale business.

Denmark - The Danish market is small with a volume of manufactured cigarettes of 6.6 billion in 1991. (Sale of roll your own is quite large in Denmark with an estimated volume of an additional 2 billion units.) The market is dominated by the Skandinavisk Tobakskompagni which markets cigarettes through the newly created, 100% owned subsidiary, the House of Prince. The House of Prince has a market share of 97.9%. Imported cigarettes make up the balance of sales. The largest brand sold by the House of Prince is Prince which is marketed in three tar ranges - Prince (or classic Prince) at 16 mg tar, Prince Light at 13 mg tar, and Prince Ultra Light at 9 mg tar. Market share in Denmark for the total Prince family is 54%. Other House of Prince Brands are New Look (22% market share) and Cecil (11% market share). Prince has been extremely successful in the Scandanavian market as a whole where it has a 39.3% market share up from 38.3% in 1991. The Prince family has 55.4% of the Norway market and 25.1% of the Swedish market. Prince is being aggressively marketed elsewhere. It has achieved a 1.4% share on the German market, and imports into Greece, the second largest market, rose by 30% in 1991. Denmark exported a small number of cigarettes into Eastern Europe last year, and there are plans to introduce Prince into France by 1992. It should be noted that 32% of Skandinavisk Tobakskompagni is owned by BAT.

Sweden - The Swedish market of 10.5 billion units is dominated by Svenska Tobaks' House of Blends which has an 85% market share. (This market share includes a 25% share for the Prince family which is manufactured in Sweden under license from the House of Prince. See Denmark above.) Svenska Tobaks has eight profit centers among which is Reserca AB which engages in tobacco-related research. This is probably the only tobacco R&D group which has been organized as a profit center. Sweden is clearly experiencing a growing trend to lighter cigarettes, and Right Ultra and Prince Extra Lights (9 mg) were introduced in 1990. Additionally, Star Light, introduced at the end of 1989, features a new Curzel filter developed by Reserca. This filter contains activated charcoal and apparently took three years to develop. What is different about this filter from a standard activated charcoal filter is not known at this time. Sweden is one of the few (if not the only) European countries with a significant menthol segment. The market share of menthol products is about 10%.

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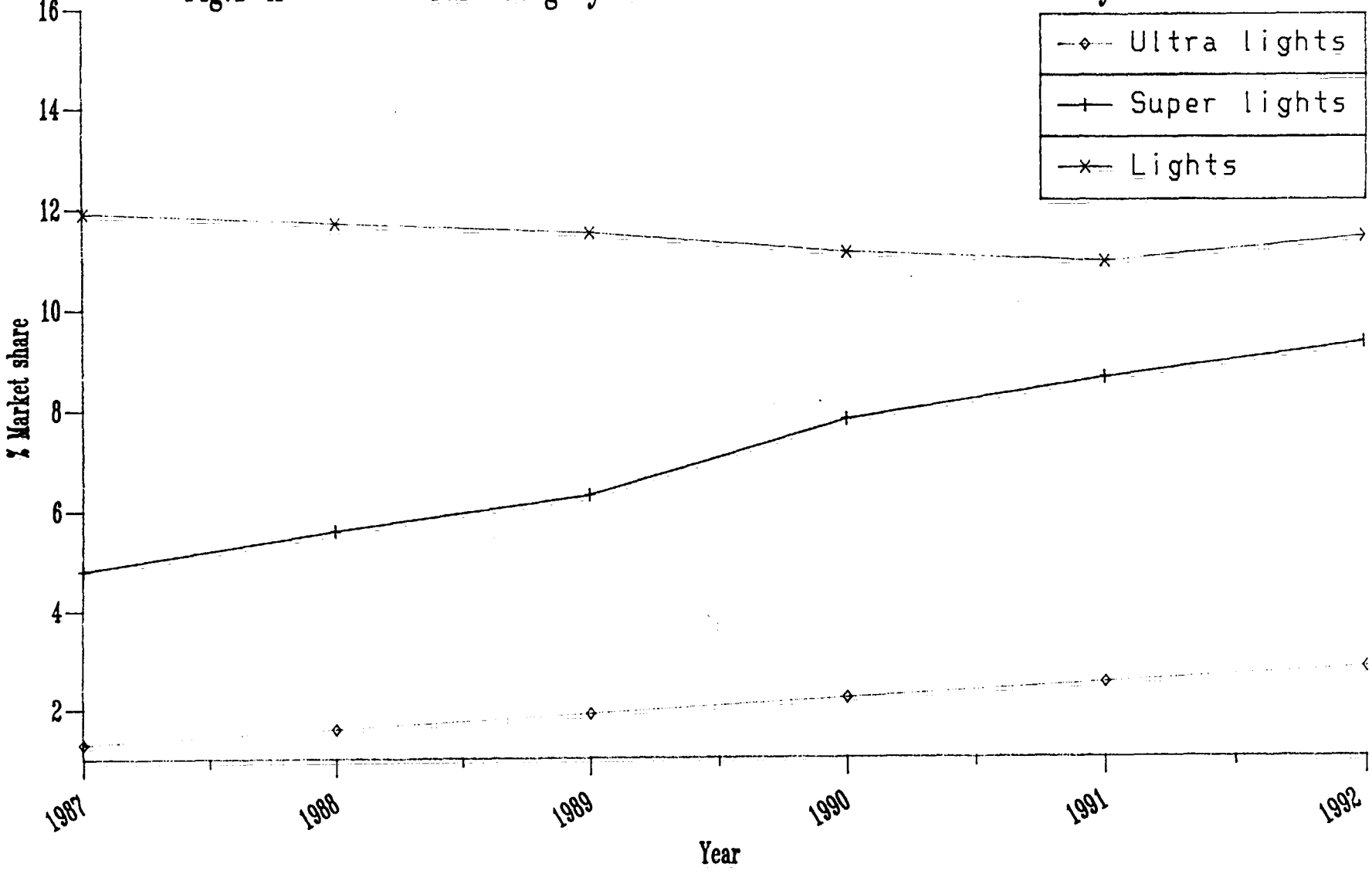
Fig.1-A Tar Category vs. Market Share for West Germany



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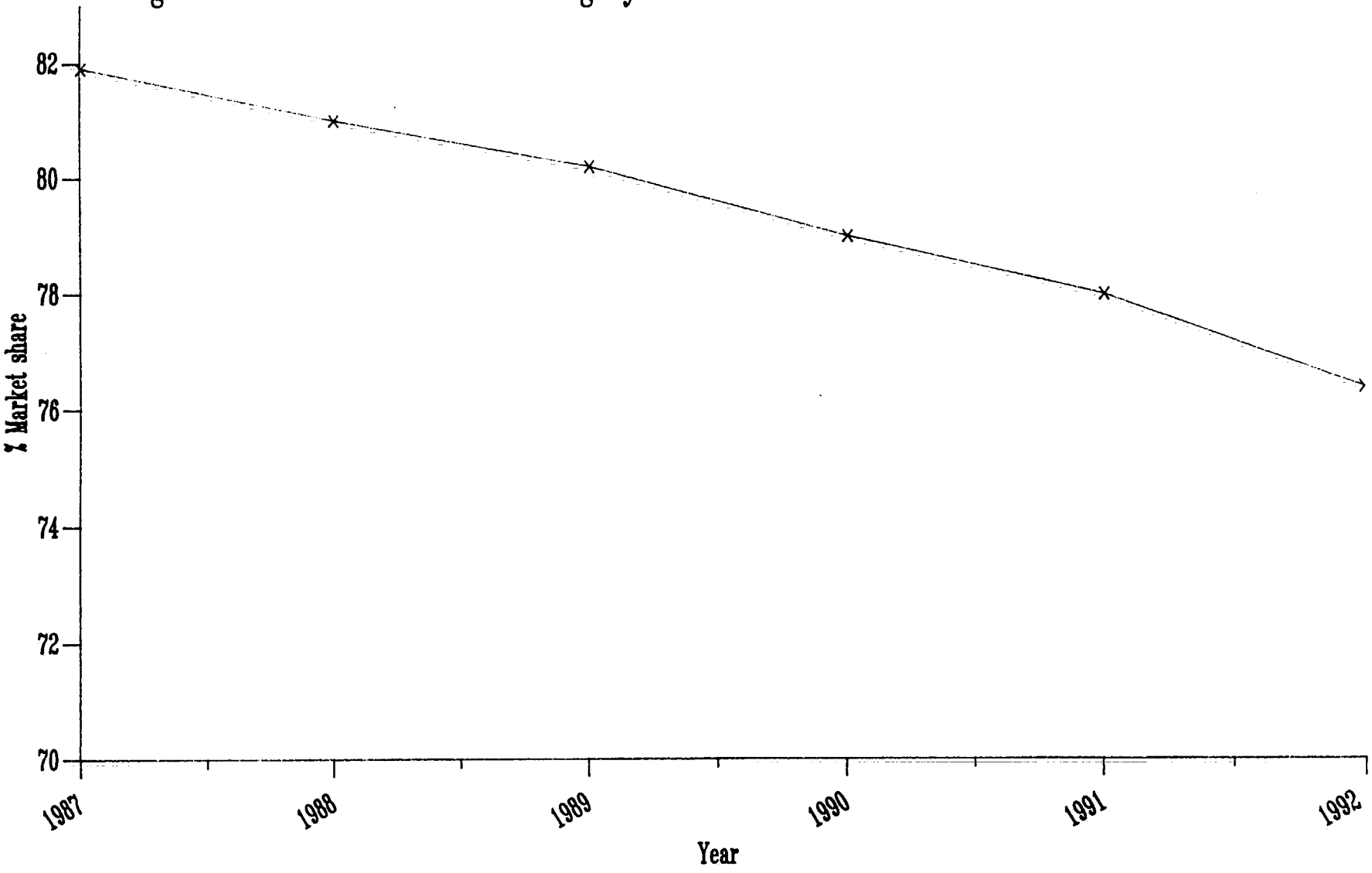
Source: https://www.industrydocuments.ucsf.edu/docs/ghjl0000

Fig.1-B

Tar Category : Full Flavor



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Source: https://www.industrydocuments.ucsf.edu/docs/ghjl0000

Finland - Finland has a total market of 7.2 billion units which is dominated by PM's Amer Tapakka (ATO) licensee with 66.1% market share. The 1991 market share for ATO declined by 1.3% between 1990 and 1991, and all of this decline was attributable to Marlboro. The major current trend in Finland is a price war. All three major companies in Finland have recently introduced low priced brands.

Turkey - The situation in Turkey is quite interesting. The total Turkish market is rather large, with total sales of 76 billion. Moreover, there is virtually no anti-smoking movement in Turkey, and sales are anticipated to increase at a rate of more than 5% per year. Through the end of 1990 Turkey had been an excellent export market for PM USA in that cigarettes imported into Turkey consisted of 22.2% of the market. As a consequence, when the original Council of Ministers Decree on private sector cigarette manufacture passed in 1986 was revised in 1991, making it more profitable to manufacture cigarettes in Turkey as opposed to importing them, PM wasted no time in initiating construction on a large factory in Torbali with an ultimate capacity of 30 billion units. RJ Reynolds Tobacco International followed suit with an announcement of plans to build a manufacturing facility in the Izmir area with an initial capacity of 10 billion units. Rothmans also plans to build a plant in the Izmir area, with perhaps half the capacity of the Reynolds plant, while BAT has expressed interest as well. In the midst of all of this activity by the multinational cigarette companies, the Turkish monopoly, TEKEL, has taken measures to protect its market share. To quote Mustafa Guclu, TEKEL's chairman and director, TEKEL must promote quality through investments in technology and modernized operations, and it must begin to think like a private company. TEKEL recently introduced an American blended product, TEKEL 2000, and sales have reached an estimated 12 billion units. However, the events which have benefitted TEKEL the most are two very large price increases in the last 18 months which have affected imported brands much more significantly than TEKEL brands. For instance, Marlboro 100's, Barclay 100's, and Camel 100's all cost 9000 TL, compared to 6000 TL for TEKEL 2000 and 3000-4000 for other TEKEL brands. In February, 1990, the three imported brands mentioned above cost 3100 TL compared to 2600 for TEKEL 2000 and between 1100 to 1300 for other TEKEL brands. The effect of this price increase was already obvious in 1991 as shown by a decrease in the import segment from 22.2% to 16.1%. Pricing policies with regard to "foreign" brands produced in Turkey do not appear to be published at this time, however. Turkey is still largely an Oriental cigarette market. The leading brand is Maltepe KS with a 42.9% share. However, as pointed out above, American blended cigarettes are growing in popularity, and TEKEL 2000 has increased in market share from 2.6% in 1990 to 11.2% in 1991 to become the number 3 brand. Marlboro 100 is the number 2 brand with a market share of 11.4%.

Conclusions - PM Europe's strategy with regard to EEMA countries appears to be to market well established brands, particularly Marlboro, in these countries expecting to obtain significant growth because of an increasing trend in many of these countries toward American blended cigarettes and - for Eastern Europe - an increase in purchasing power due to the introduction of a free market economy. The sketchy analysis above suggests that this strategy may not be sufficient. The expected increase in purchasing power may be a long time coming. When this is coupled with the fact that cigarettes are an excellent source of government revenue through taxes, and that "western" brands are likely to be taxed at a higher rate, significant growth in many of these countries for PM may also require the production of low priced "local" brands. In addition, our competition is not standing still. We face potential threats from a number of European and American cigarette manufacturers in these regions. These competitors may be more than willing to carve out a larger piece of the pie by adopting strategies which may result in a lower marginal profit. In order to protect both market share and profit in the EEMA region, therefore, an essential R&D strategy must be to lower cigarette cost. There is a second issue which arises from the fact that cigarette taxes are continuing to increase significantly in both the EEC and EEMA

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